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# NASA Procedural Requirements

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 (NASA Only)

## Subject: NASA Space Flight Program and Project Management Requirements

**Responsible Office: Office of the Chief Engineer**

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## APPENDIX A. Definitions

**Acceptable Risk.** The risk that is understood and agreed to by the program/project, governing PMC, Mission Directorate, and other customer(s) such that no further specific mitigating action is required. (Some mitigating actions might have already occurred.)

**Acquisition.** The acquiring by contract with appropriated funds of supplies or services (including construction) by and for the use of the Federal Government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, and evaluated. Acquisition begins at the point when Agency needs are established and includes the description of requirements to satisfy Agency needs, solicitation and selection of sources, award of contracts, contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling Agency needs by contract. (Note: A broader view of the term *acquisition* is taken at the ASP meeting and ASM.)

**Agency Program Management Council (Agency PMC).** The senior management group, chaired by the NASA Associate Administrator or designee, responsible for reviewing formulation performance, recommending approval, and overseeing implementation of programs and Category 1 projects according to Agency commitments, priorities, and policies.

**Aircraft Operations.** A mission support organization function that provides both manned and unmanned aircraft, whether U.S. Government owned or chartered, leased, or rented to accomplish work for NASA.

**Analysis of Alternatives.** A formal analysis method that compares alternative approaches by estimating their ability to satisfy mission requirements through an effectiveness analysis and by estimating their life-cycle costs (LCC) through a cost analysis. The results of these two analyses are used together to produce a cost-effectiveness comparison that allows decision-makers to assess the relative value or potential programmatic returns of the alternatives. An AoA broadly examines multiple elements of program/ project alternatives (including technical performance, risk, LCC, and programmatic aspects).

**Approval (for Implementation).** The acknowledgment by the Decision Authority that the program/project has met stakeholder expectations and formulation requirements, and is ready to proceed to implementation. By approving a program/project, the Decision Authority commits the budget resources necessary to continue into implementation. Approval (for Implementation) must be documented.

**Approval.** Authorization by a required management official to proceed with a proposed course of action. Approvals must be documented.

**Architectural Control Document (ACD).** A configuration-controlled document or series of documents that embodies an Agency mission architecture(s), including the structure, relationships, principles, assumptions, and results of the analysis of alternatives that govern the design of the enabling mission systems.

**Baseline (Document Context).** Implies the expectation of a finished product, though updates may be needed as circumstances warrant. All approvals required by Center policies and procedures have been obtained.

**Baseline Science Requirements.** The mission performance requirements necessary to achieve the full science objectives of the mission. (Also see Threshold Science Requirements.)

**Center Management Council (CMC).** The council at a Center that performs oversight of programs and projects by evaluating all program and project work executed at that Center.

**Component Facilities.** Complexes that are geographically separated from the NASA Center or institution to which they are assigned.

**Concurrence.** A documented agreement by a management official that a proposed course of action is acceptable.

**Configuration Management.** A management discipline applied over the product's life cycle to provide visibility into and to control changes to performance, functional, and physical characteristics.

**Contract.** A mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. It includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing. In addition to bilateral instruments, contracts include (but are not limited to) awards and notices of awards; job orders or task letters issued under basic ordering agreements; letter contracts; orders, such as purchase orders, under which the contract becomes effective by written acceptance or performance; and bilateral contract modifications. Contracts do not include grants and cooperative agreements.

**Convening Authority.** The management official(s) responsible for convening a program/project review, establishing the Terms of Reference, including review objectives and success criteria, appointing the SRB chair, concurring in SRB membership, and receiving documented results of the review.

**Cost Analysis Data Requirement (CADRe).** A formal document designed to help managers to understand the cost and cost risk of space flight projects. The CADRe consists of a Part A "Narrative," a Part B "Technical Data" in tabular form, both provided by the program/project to the ICE team. A "Project Life Cycle Cost Estimate," produced by the project team, is appended as Part C, but the ICE team does not see Part C until it has produced its own independent estimate.

**Decision Authority.** The Agency's responsible individual who authorizes the transition of a program/project to the next life-cycle phase.

**Derived Requirements.** For a program, requirements that need to be satisfied in order to satisfy the Directorate requirements on the program. For a project, requirements that need to be satisfied in order to satisfy the program requirements on the project.

**Design Report.** A document or series of documents that captures and communicates to others specific technical aspects of a design. It may include images, tabular data, graphs, and other descriptive material. A design report is different from the CADRe, though parts of a design report may be repeated in the latter.

**Earned Value Management (EVM).** A tool for measuring and assessing project performance through the integration of technical scope with schedule and cost objectives during the execution of the project. EVM provides quantification of technical progress, enabling management to gain insight into project status and project completion costs and schedules. Two essential characteristics of successful EVM are EVM system data integrity and carefully targeted monthly EVM data analyses (i.e., risky WBS elements).

**Engineering Requirements.** Requirements defined to achieve programmatic requirements and relating to the application of engineering principles, applied science, or industrial techniques.

**Environmental Impact.** The direct, indirect, or cumulative beneficial or adverse effect of an action on the environment.

**Environmental Management.** The activity of ensuring that program and project actions and decisions that potentially impact or damage the environment are assessed/evaluated during the formulation/planning phase and reevaluated throughout implementation. This activity must be performed according to all NASA policy and Federal, state, and local environmental laws and regulations.

**Evaluation.** The continual, independent (i.e., outside the advocacy chain of the program/project) evaluation of the performance of a program or project and incorporation of the evaluation findings to ensure adequacy of planning and execution according to plan.

**Final (Document Context).** Implies the expectation of a finished product. All approvals required by Center policies and procedures have been obtained.

**Formulation.** The identification of how the program or project supports the Agency's strategic needs, goals, and objectives; the assessment of feasibility, technology and concepts; risk assessment, team building, development of

operations concepts and acquisition strategies; establishment of high-level requirements and success criteria; the preparation of plans, budgets, and schedules essential to the success of a program or project; and the establishment of control systems to ensure performance to those plans and alignment with current Agency strategies.

**Formulation Authorization Document (FAD).** The document issued by the MDAA (or MSOD) to authorize the formulation of a program whose goals will fulfill part of the Agency's Strategic Plan, Mission Directorate Strategies, or Mission Support Office Functional Leadership Plans. In addition, a FAD or equivalent is used to authorize the formulation of a project.

**Implementation.** The execution of approved plans for the development and operation of the program/project, and the use of control systems to ensure performance to approved plans and continued alignment with the Agency's strategic needs, goals, and objectives.

**Independent Cost Analysis (ICA).** An independent analysis of program resources (including budget) and financial management associated with the program content over the program's budget horizon, conducted by an impartial body independent from the management or advocacy chain of the program. ICA includes, but is not limited to, the assessment of cost estimates, budgets, and schedules in relation to the program and its constituent projects' technical content, performance, and risk. ICAs may include Independent Cost Estimates (ICE), assessment of resource management, distribution and planning, and verification of cost-estimating methodologies. (ICAs are not life-cycle cost estimates but are assessments of the adequacy of the budget and management practices to accomplish the work scope through the budget horizon; as such, ICAs can be performed for programs/projects when a life-cycle ICE is not warranted.)

**Independent Cost Estimate (ICE).** An independent project cost estimate prepared by an office or other entity that is not under the supervision, direction, advocacy, or control of the project (or its chain of command) that is responsible for carrying out the development or acquisition of the program/project. An ICE is bounded by the project scope (total life cycle through all phases), schedule, technical content, risk, ground rules, and assumptions and is conducted with objectivity and the preservation of integrity of the cost estimate. ICEs are generally developed using parametric approaches that are tailored to reflect the design, development state, difficulty, and expertise of team members.

**Information Technology.** Any equipment, or interconnected system(s) of subsystem(s) of equipment, that is used in the automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the Agency.

**Infrastructure Requirements.** The facilities, environmental, aircraft, personal property, equipment, and information technology resources that are needed to support programs and projects. Utilization of the capability afforded by the infrastructure includes consideration of the maintenance and other liabilities it presents.

**In-House Project.** One that is conducted onsite or in the immediate vicinity of a NASA Center in which most major technical, business, and management tasks are performed primarily by the Centers' civil service workforce.

**Institutional Requirements.** Infrastructure and workforce needed to support programs and projects. Specifically, the human resources, real property, facilities, aircraft, personal property, equipment, information technology resources, and administrative and program support services (e.g., environmental management) required to support programs and projects.

**Integrated Baseline.** The projects' technical performance baseline/mission content, technology application, and schedule milestones. The integrated baseline also includes the WBS, WBS dictionary, integrated master schedule, life-cycle cost and workforce estimates that are consistent with the program requirements on the project, the projects' CADRe (if applicable), and the technical performance baseline/mission content.

**Integrated Baseline Review (IBR).** A joint assessment by the offeror/contractor and the Government to verify the technical content and the realism of the related performance budgets, resources, and schedules. It should provide a mutual understanding of the inherent risks in offerors'/contractors' performance plans and the underlying management control systems, and it should formulate a plan to handle these risks.

**Integrated Master Schedule.** An integrated set of schedule data that reflects the total project scope of work as discrete and measurable tasks/milestones that are time-phased through the use of task durations, interdependencies, and date constraints and is traceable to the WBS.

**Key Decision Point (KDP).** The event at which the Decision Authority determines the readiness of a program/project to progress to the next phase of the life cycle (or to the next KDP).

**Life-Cycle Cost (LCC).** The total of the direct, indirect, recurring, nonrecurring, and other related expenses incurred, or estimated to be incurred, in the design, development, verification, production, operation, maintenance, support, and disposal of a project. The LCC of a project or system can also be defined as the total cost of ownership over the project or systems' life cycle from formulation through implementation. It includes all design, development, deployment, operation and maintenance, and disposal costs.

**Logistics.** The management, engineering activities, and analysis associated with design requirements definition, material procurement and distribution, maintenance, supply replacement, transportation, and disposal that are identified by space flight and ground systems supportability objectives.

**Management Requirements.** Requirements that focus on how NASA does business that are independent of the particular program or project. There are four types: engineering, program/project management, safety and mission assurance, and Mission Support Office functional requirements.

**Margin.** The allowances carried in budget, projected schedules, and technical performance parameters (e.g., weight, power, or memory) to account for uncertainties and risks. Margin allocations are baselined in the formulation process, based on assessments of risks, and are typically consumed as the program/project proceeds through the life cycle.

**Metric.** A measurement taken over a period of time that communicates vital information about the status or performance of a system, process, or activity. A metric should drive appropriate action.

**Mission.** A major activity required to accomplish an Agency goal or to effectively pursue a scientific, technological, or engineering opportunity directly related to an Agency goal. Mission needs are independent of any particular system or technological solution.

**Mission Directorate Program Management Council (MDPMC).** The senior management group, chaired by an MDAA or designee, responsible for reviewing project formulation performance, recommending approval, and overseeing implementation of Category 2 and 3 projects according to Agency commitments, priorities, and policies.

**Mission Support Office Requirements.** Requirements defined by Mission Support Offices (e.g., procurement, and medical).

**Non-Advocate Review (NAR).** The analysis of a proposed program or project by a (non-advocate) team composed of management, technical, and resources experts (personnel) from outside the advocacy chain of the proposed program or project. It provides Agency management with an independent assessment of the readiness of the program/project to proceed into implementation.

**Preliminary (Document Context).** Implies that the product has received initial review in accordance with Center best practices. The content is considered correct, though some TBDs may remain. All approvals required by Center policies and procedures have been obtained. Major changes are expected.

**Principal Investigator (PI).** A person who conceives an investigation and is responsible for carrying it out and reporting its results. In some cases, PIs from industry and academia act as Project Managers for smaller development efforts with NASA personnel providing oversight.

**Primary Risks.** Those undesirable events having both high probability and high impact/severity.

**Procurement Strategy Meeting (PSM).** A meeting in which the Program/Project Manager, supported by the contracting officer, seeks Agency approval of the procurement approach (e.g., competition approach, small business goals, and government furnished property). The PSM is normally contract-specific but may address all contracts within a project. PSMs can occur multiple times over the project life cycle, are held prior to release of a solicitation, and are conducted in accordance with the NASA FAR Supplement. (The initial PSM will typically be held between the SDR/MDR/PNAR and the PDR/NAR. The AO process embodies the activities included in a PSM; therefore, a separate PSM is not required for AO-driven projects.)

**Program.** A strategic investment by a Mission Directorate or Mission Support Office that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. A program defines a strategic direction that the Agency has identified as critical.

**Program Commitment Agreement (PCA).** The contract between the Associate Administrator and the cognizant MDAA that authorizes transition from formulation to implementation of a program.

**Program Plan.** The document that establishes the Programs' baseline for implementation, signed by the MDAA, Center Director(s), and Program Manager.

**Program (Project) Team.** All participants in program (project) formulation and implementation. This includes all direct reports and others that support meeting program (project) responsibilities.

**Programmatic Requirements.** Requirements set by the Mission Directorate, program, project, and PI, if applicable. These include strategic scientific and exploration requirements, system performance requirements, and schedule, cost, and similar non-technical constraints.

**Program/Project Management Requirements.** Requirements that focus on how NASA and Centers perform program and project management activities.

**Project.** A specific investment identified in a *Program Plan* having defined requirements, a life-cycle cost, a beginning, and an end. A project yields new or revised products that directly address NASA's strategic needs.



**Project Plan.** The document that establishes the Project's baseline for implementation, signed by the cognizant Program Manager, Center Director, Project Manager, and the MDAA, if required.

**Reimbursable Program/Project.** A program/project executed at a NASA Center for a sponsor other than NASA.

**Risk.** The combination of the probability that a program or project will experience an undesired event and the consequences, impact, or severity of the undesired event, were it to occur. The undesired event may come from technical or programmatic sources (e.g., a cost overrun, schedule slippage, safety mishap, health problem, malicious activities, environmental impact, failure to achieve a needed scientific or technological objective, or success criterion). Both the probability and consequences may have associated uncertainties.

**Risk Assessment.** An evaluation of a risk item that determines (1) what can go wrong, (2) how likely is it to occur, (3) what the consequences are, and (4) what are the uncertainties associated with the likelihood and consequences.

**Risk-Based Acquisition Management.** The integration of risk management into the NASA acquisition process.

**Risk Management.** An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risk and establishes mitigation approaches and plans to increase the likelihood of achieving program/project goals.

**Safety.** Freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.

**Safety and Mission Assurance Requirements.** Requirements defined by the SMA organization related to safety and mission assurance.

**Security.** Protection of people, property, and information assets owned by NASA, which covers physical assets, personnel, IT, communications, and operations.

**Stakeholder.** An individual or organization having an interest (or stake) in the outcome or deliverable of a program or project.

**Standing Review Board (SRB).** The entity responsible for conducting independent reviews of the program/project per the life-cycle requirements. The SRB is advisory and is chartered to objectively assess the material presented by the program/project at a specific review.

**Success Criteria.** That portion of the top-level requirements that defines what must be achieved to successfully satisfy NASA Strategic Plan objectives addressed by the program or project.

**System.** The combination of elements that function together to produce the capability required to meet a need. The elements include all hardware, software, equipment, facilities, personnel, processes, and procedures needed for this purpose.

**Systems Engineering.** A disciplined approach for the definition, implementation, integration, and operation of a system (product or service). The emphasis is on achieving stakeholder functional, physical, and operational performance requirements in the intended use environments over its planned life within cost and schedule constraints. Systems engineering includes the engineering processes and technical management processes that consider the interface relationships across all elements of the system, other systems, or as a part of a larger system.

**Technical Authority.** The individual who specifically maintains technical responsibility over establishment of, changes to, and waivers of requirements in a designated area.

**Termination Review.** A review initiated by the Decision Authority for the purpose of securing a recommendation as to whether to continue or terminate a program or project. Failing to stay within the parameters or levels specified in controlling documents will result in consideration of a termination review.

**Terms of Reference (ToR).** A document specifying the nature, scope, schedule, and ground rules for an independent review or independent assessment.

**Threshold Science Requirements.** The mission performance requirements necessary to achieve the minimum science acceptable for the investment. In some AOs used for competed missions, threshold science requirements may be called the "science floor" for the mission. (Also see Baseline Science Requirements.)

**Validation.** Proof that the product accomplishes the intended purpose based on stakeholder expectations. May be determined by a combination of test, analysis, demonstration, and inspection.

**Verification.** Proof of compliance with design solution specifications and descriptive documents. May be determined by a combination of test, analysis, demonstration, and inspection.

**Waiver.** A documented authorization intentionally releasing a program or project from meeting a requirement.

**Work Agreement.** The Center form (or equivalent), prepared for each program/project cost account and used to document agreements and commitments for the work to be performed, including scope of work, receivables/deliverables, schedule, budget, and assumptions.

**Work Breakdown Structure (WBS).** A product-oriented hierarchical division of the hardware, software, services, and data required to produce the program/project's end product(s), structured according to the way the work will be performed, and reflective of the way in which program/project costs, schedule, technical and risk data are to be accumulated, summarized, and reported.

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